

## Effects of Culture Conditions of Fe-oxidation in a Newly-isolated *Thiobacillus ferrooxidans*

Yasin Rakhshani<sup>\*1</sup>; Jamshid Raheb<sup>2</sup>; Fatemeh Tabandeh<sup>2</sup>; Azar Sabokbar<sup>1</sup>; Mahmood Arabnezhad<sup>3</sup>

1-Department of Microbiology, Karaj Branch, Islamic Azad University, Karaj, Iran

2-National Institute for Genetic Engineering and Biotechnology, Tehran, Iran

3-National Iranian Copper Industries Corporation, Tehran, Iran

yasin.rakhshani@yahoo.com

**Background & Objectives:** Bioleaching is a process utilizing microorganisms to extract heavy metals from ores. This process can be carried out by several groups of bacteria but the most commonly-used one is *Acidothiobacillus*. The main aim of this research was to isolate the local bacteria from Meydook ore in order to achieve the best strain. The effect of culture medium, temperature and pH on bioleaching process was also investigated.

**Methods:** The mineral 9-K medium was utilized for bacterial growth and leaching. The samples of ore were treated with 0.1 N sulfuric acid then, 70 ml of resulting liquid was added to 200 ml of K-9 medium and incubated at 30° C. DNA extraction and PCR DNA was extracted using DNA extraction kit. The spacer region between 16s and 23s genes was amplified by PCR using forward and reverse primers of 27F and 1492R. Optimization of the medium Temperature, pH and culture medium components were optimized by statistical Methods and analyzed by Design-expert-6.0.10 software.

**Results:** The indigenous bacterium *Acidothiobacillus ferrooxidans* was registered in NBCI gene bank with FR772290 number. Furthermore, the optimum culture conditions were obtained as follows: (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> (1.5 g/L), KH<sub>2</sub>PO<sub>4</sub> (0.34 g/L), MgSO<sub>4</sub> (0.34 g/L), KCl (0.2 g/L), Ca(NO<sub>3</sub>)<sub>2</sub> (0.01 g/L), FeSO<sub>4</sub> 7H<sub>2</sub>O (25g/L), pH (2.5), temperature (35 °C).

**Conclusion:** It was demonstrated that the most effective factors on Fe-oxidation process by the bacterium were temperature, pH and the amount of FeSO<sub>4</sub> 7H<sub>2</sub>O.

**Keywords:** Bioleaching; *Thiobacillus ferrooxidans*; Copper; Optimization